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BULLETIN No. 95.   SEPTEMBER, 1903.

DANDELIONS, HAWKWEEDS,
GINSENG, CANKER WORMS.

This Bulletin is prepared in response to numerous questions which have been sent to the Experiment Station.

Requests for bulletins should be addressed to the
Agricultural Experiment Station,
Orono, Maine.

MAINE

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ORONO, MAINE.

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DANDELIONS.

W. M. Munson.

It is a common practice in most places to permit perfect freedom to the hordes of women and children which every spring invade the roadsides and sunny slopes of parks and private grounds in search of "greens;" in other words, of the common dandelion. Contrary to the usual notion, however, this is the worst possible thing for the lawn thus sought out; for in addition to the injury caused by the knives and trowels used in digging the roots, every top or crown cut off will in a short time send up in its place from one to six new crowns and the lawn is frequently ruined.

A hardly less common pest in the lawns of the state is the Fall Dandelion, *Leontodon autumnale*. This plant, often wrongly called "arnica," manifests itself in late summer and early fall, as its name implies, and often takes complete possession of fields and lawns; its flat, spreading, radical leaves choking out all grass and other competing plants in its neighborhood. This, as well as the first mentioned species, grows readily from root cuttings and ordinary digging of the plants has the effect of multiplying them, although not to so great an extent as with the spring dandelion.

The common dandelion is too well known to need description, but the other species is frequently overlooked. In brief, it is characterized by a branched, rather fleshy root; very numerous, long, rather slender and very deeply cut leaves in a thick mass at the surface of the ground; slender branching flower scape, 8 to 12 inches high; peduncles thickish and scaly bracted next to the small (½-¾ inch) deep yellow head.

With a view to ascertaining precisely the behavior of mutilated plants and of young seedlings of both species, seeds were sown and root cuttings were made in the fall. These

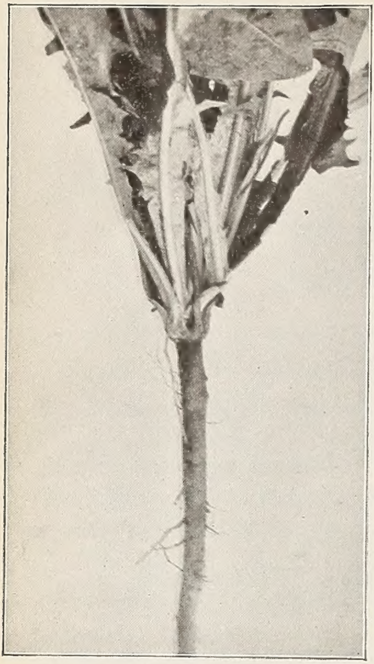

Figure 28—Seedling of common dandelion.

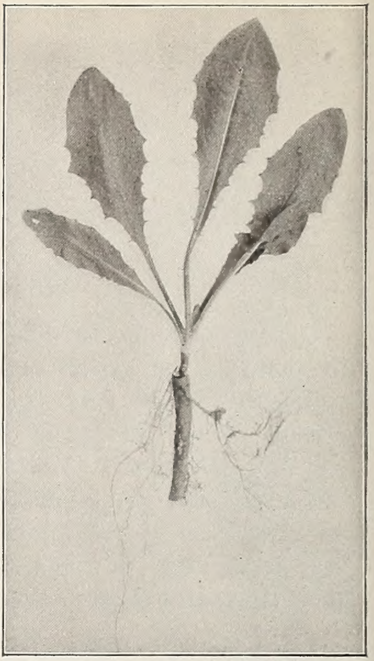

Figure 29—Root cutting of common dandelion.

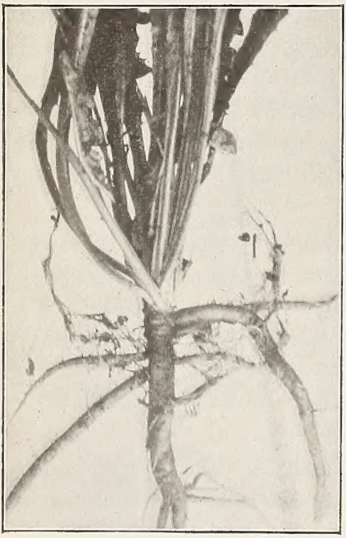

Figure 30 - Mature dandelion plant.

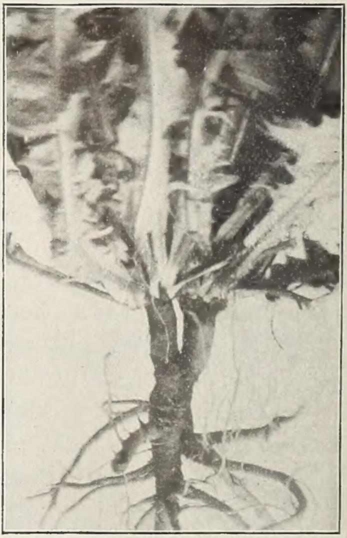

Figure 31—Dandelion plant which has been cut for "greens."

were grown in the green house where they could be under constant observation. Some of them are shown in the accompanying figures.

Figure 28 represents a seedling plant of the common dandelion *(Taraxacum officinale)* in its normal condition. Figure 29 shows a small root cutting which is forming a new plant. Figure 30 shows a normal branching root of a mature plant and figure 31 a plant which at some time has been cut off about two inches beneath the surface. It is evident that by severing the numerous side roots of such plants as that shown in figure 30, the crop of dandelions on the lawn will be materially increased by cutting the existing plants. Figure 32 represents the condition many lawns exhibit after having been dug freely for greens for a few years.

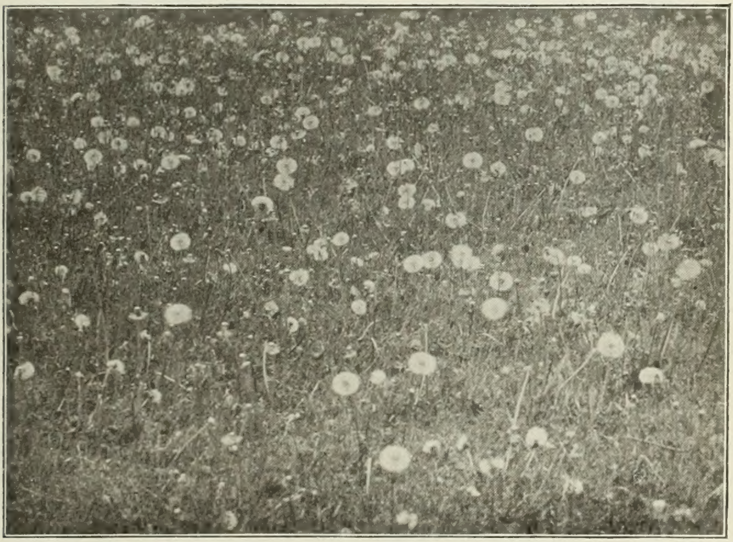

Figure 32.—Effect of continued digging for "greens."

The fall dandelion, shown in figures 33 and 34, also grows readily from root cuttings; but as this plant is not used for greens it is seldom spread by promiscuous digging. It seeds very freely, however, and spreads rapidly in this way.

Since digging the roots in the ordinary manner will not exterminate the dandelion and since both species spread rapidly by seed, it is evident that great care must be used in order to exclude this pest from the lawn. The first preventive measure is thick seeding in the first formation of the lawn. Nature abhors bare ground, and if young grass plants do not occupy a given space, weeds will be sure to come in. The best authorities on making lawns recommend from 3 to 5 bushels of seed per acre; and in every case it is the part of economy to purchase the best fancy cleaned seed. If, for any reason, a lawn has become badly infested with dandelions, as in figure 32, absolute renewal by seeding or by sodding is advised. If but few plants are present, they may be removed (care being taken to dig deep) and a little grass seed sprinkled on the place where the plants stood. Like witch grass, or any other weed, both of the dandelions are readily controlled by frequent cultivation; so that they seldom become serious pests except in grass plots.

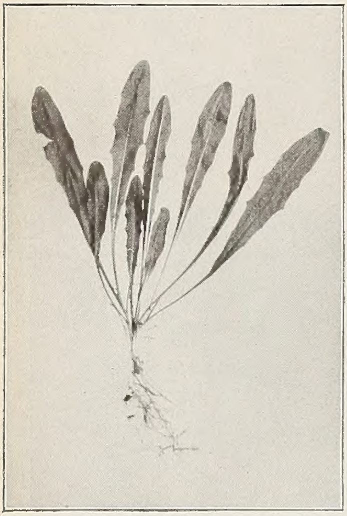

Figure 33—Fall dandelion seedling, 60 days old.

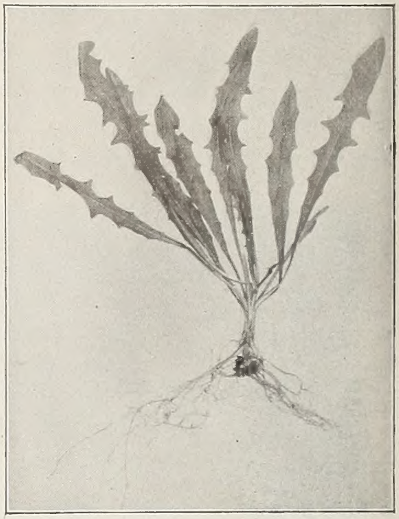

Figure 34– Root cutting of fall dandelion.

CULTIVATED DANDELIONS.

As a cultivated plant the dandelion is assuming an important place in the garden of New England, and in the large market gardens it is grown by the acre, yielding a handsome profit. Like celery it is best when grown rapidly on rich sandy loam.

Sow the seed in early spring in drills 12 to 15 inches apart and cover 1-4 to 1-2 inch deep. As the young plants are small and dark colored, it is well to mix a few radish or lettuce seeds with the dandelion seed. Give the same culture as for carrots during the summer, except that the plants require thinning to 8-10 inches apart, and the following spring the leaves will be fit to cut. They are best when partially blanched by placing a covering of boards or boughs over the rows, thus modifying the bitter taste and rendering them tender and superior to those growing wild or in grass land. The plants are prepared and marketed the same as spinach, and may be grown profitably at 50 cents per bushel, though the price is frequently much higher.

In beds for forcing the seed may be sown in rows 6 inches apart, or plants may be removed from the field. Seedlings are usually best. Except in a limited way, the forcing of the plants could never be recommended, as other plants mature so much more quickly.

There are but few varieties of dandelions listed. The most important are the French Garden and the Improved Thick Leaved.

THE HAWKWEEDS.

W. M. MUNSON.

The wide distribution of the Orange Hawkweed *(Hieracium aurantiacum)* throughout the State has been the subject of frequent comment in previous reports of the Experiment Station*. As yet, however, no effective legislative measures have been adopted for the check of this or other noxious weeds, and its importance demands continued attention. A man is, to a large extent, at the mercy of his neighbors in the matter of spreading weeds. While we have laws looking toward the control of the seed offered for sale, little attention is given to the weedy roadsides and waste lands in proximity to our best cultivated fields. The character of the seed sown is of as much importance as the character and composition of the fertilizer used; but it is not enough that the field be free from weeds at the time of sowing or that the grain or grass seed used show a high per cent of purity. This freedom from noxious weeds must be maintained by destroying the sources of infection found, as already noted, in neighboring fields and roadsides.

Orange Hawkweed is a native of Europe and has been recorded in this state as a weed, only about fifteen years. It is advertised by some seedsmen as a desirable ornamental plant, and as such it was introduced into this region, and probably to many others. Only a few weeks ago the writer found it on sale in a large store at one of the leading summer resorts of the State. From the fact that the plant is a perennial, developing runners and root stocks, and that it produces seed very freely, it is a very difficult weed to control. As illustrating its tenacity of life, flower heads which were scarcely in full bloom were picked by the writer and left upon the office table to dry. After a time the seeds from these heads were sown in pots in the greenhouse and a considerable number of young hawkweed plants at once sprang up.

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*Cf. Rept. Me. Exp. Sta. 1892, 106; 1893, 146; 1897, 13.

The plant is now, unfortunately, so well known as to need little description. The concise account given by Professor Harvey in a previous bulletin is, however, repeated; 'Stem simple, erect, nearly leafless, one to two feet high, clothed with hairs, those at the top of the stem black at the base. Leaves mostly at the roots, oblong-lanceolate, toothed, hairy on both sides and without a petiole. The conspicuous heads of orange colored flowers in a flat-topped cluster at the end of the stem. Heads composed of numerous small orange colored flowers, each one of which produces at its base a small dark brown, ten-ribbed seed-like fruit, with dirty white hairlike bristles at the top.'*

TREATMENT.

This plant is one of our worst weeds and is without one redeeming feature. It kills all of the grass in its vicinity with its dense mat of leaves and it is of itself of no use as hay. The only certain remedy for it is clean culture in some hoed crop. By this means, however, it may readily be held in check; as it has been in several instances on the Station farm. The early and frequent cutting of infested patches of grass may prevent the formation of seed, but has no effect upon the formation of runners.

Numerous attempts have been made to destroy this weed by applications of salt,† kerosene, etc. All experience at this Station, however, but emphasizes the statement before made, viz., that clean culture is a certain method, and the only certain method of extermination. Every intelligent and progressive farmer will on the first appearance of this pest take active means of checking its spread.

THE KING-DEVIL WEED.

Sometimes associated with the hawkweed is a closely related species known as the King-Devil Weed (*Hieracium prealtum*).

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*Harvey, Bul 32. Maine Exp. Sta. Jan. 1897.
†Jones, Bul. 56—Vermont Exp. Sta.

This plant has proved very troublesome in northern New York where it is regarded as even worse than the hawkweed. It has been reported from several sections in Maine, especially in Kennebec and Penobscot counties. The King-Devil weed is of more vigorous habit than its relative, producing stems two feet or more high, and from one to four or five from the same root. The leaves are lanceolate with winged petioles, slightly wavy margins, pale green both sides, and covered with scattering long, white hairs. The radical leaves form a dense mat on the ground, killing out other vegetation. There are two to four smaller, narrower leaves on the lower half of the stem. The flower clusters are terminal and consist of four to twenty-four yellow heads about one-half inch long. The difference in color of flowers as compared with the orange hawkweed, is a most noticeable character. The heads, also, are smaller and more numerous than in the common hawkweed. The blossoms usually appear about the same time as the fall buttercup, and, as the flowers are of nearly the same color, the King-Devil weed may escape notice when growing in grass land. A full discussion of this weed was given by Professor Harvey in a previous report of this Station.*

TREATMENT.

Remarks as to the treatment of the orange hawkweed will apply with equal force to this plant. Treatment must begin earlier in the season, however, and greater vigilance is necessary to detect the presence of this species.

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*Report Maine Exp. Sta. 1897, 184.

GINSENG.

W. M. Munson.

In response to numerous requests for information from the Experiment Station upon the cultivation of ginseng as a business venture, the following brief suggestions have been prepared:

Ginseng is a native perennial plant having a thick, fleshy, irregular root, and leaves somewhat resembling the common sarsaparilla, to which it is quite closely related. Not infrequently specimens of sarsaparilla are sent for identification with the hope that they will prove to be ginseng. Both species are found in Maine, but sarsaparilla is the more common. The

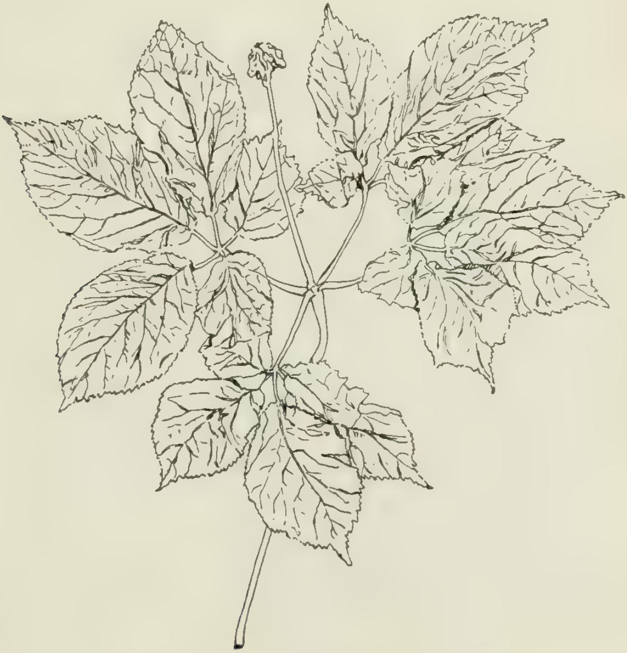

Figure 35.—Leaves and flower cluster of Ginseng.

mature plant of ginseng has a single stem 8 to 15 inches high and about as thick as a lead pencil. At the top are five compound leaves in a whorl, each resembling a leaf of the horse-chestnut. The leaves usually have five leaflets as shown in figure 35, but on young or weak plants, there may be but three. The *single flower stalk*, rising above the leaves and bearing a small cluster of greenish-white flowers followed by dark, purple berries, will help in distinguishing this plant from other similar ones.

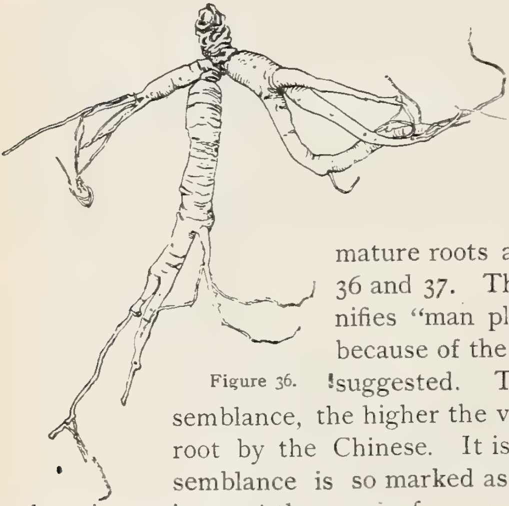

Figure 36.

The seedling roots resemble small parsnips, but the older roots are usually peculiarly branched and in shape often resemble the human form. Two of the mature roots are shown in figures 36 and 37. The name ginseng signifies "man plant" and is applied because of the fancied resemblance suggested. The greater this resemblance, the higher the value placed upon the root by the Chinese. It is seldom that the resemblance is so marked as in figure 37.

American ginseng, the use of which has to a large extent superseded that of the native plant in China, was first discovered near Montreal in 1716. It is now found in the United States from Maine and Minnesota southward to the mountainous regions of Georgia and Alabama. At present the chief sources of supply are Ohio, West Virginia and Minnesota, though small quantities are collected in many other states. The usual price per pound for the dried root is $2.50 to $3.00.

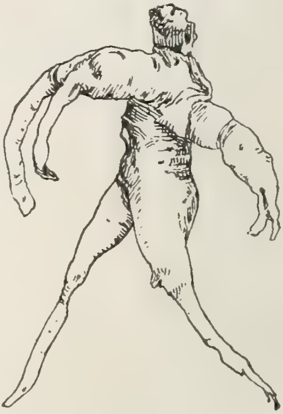

Figure 37.

Numerous attempts have been made to cultivate ginseng and, where careful attention has been given, the returns have been very satisfactory. But the plant is a native of cool, moist, shady situations, and is soon killed if exposed to the glaring sunlight. It usually thrives best in moist loamy soils such as are found in oak or maple forests at the north.

Mr. George Stanton, Summit Station, Onondaga County, New York, is the pioneer in ginseng culture in America. He has made the business profitable and has demonstrated the practicability of garden culture. His method of procedure is essentially as follows: Seed is sown as soon as it is ripe, in September, in a carefully prepared seed bed in well drained sandy loam. The bed is covered with leaf mould and with brush to prevent drying and cracking of soil. Eighteen months are usually required for germination. When the seedlings are two or three years old, they are transferred to permanent beds as carefully prepared as the first. The plants are set four to six inches apart each way and are not again disturbed, except to keep the weeds down, until the harvest time; which will be in four or five years from transplanting, or six or eight years from seed. Transplanting is best done in the fall and the roots are set so that the bud for the next year's

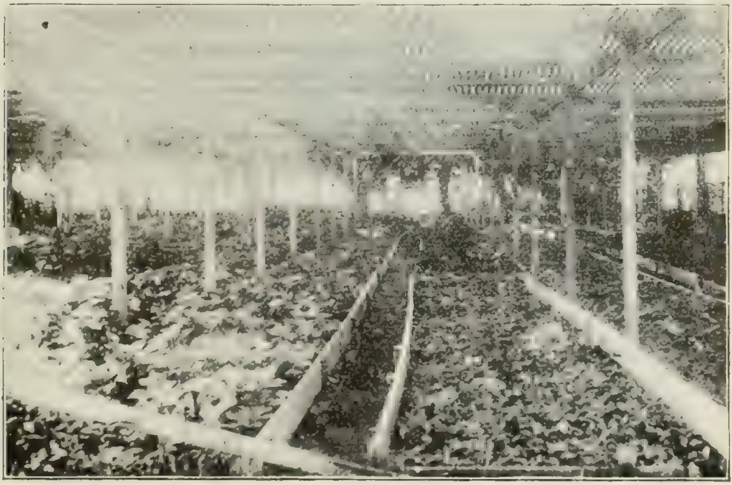

Figure 38.—Lattice-work shed for ginseng garden.

growth is about two or three inches below the surface of the ground. The roots should not be cut or trimmed. After the roots are set, an open lattice-work or lath shed should be built over the whole area covered, as indicated in figure 38. The lath roof may be made in sections and removed for storage during the winter.

The roots of cultivated plants are usually larger and more uniform than those from the wild and will bring from 50 cents to $1.00 more per pound. The long time required for returns will, however, deter most people from undertaking the work of cultivation. In general, if an experimental bed is decided upon, it is probably wise to purchase seedling plants rather than to attempt to start seedlings. But no one should be deceived by the glowing accounts of possible fabulous returns from the enterprise. The present high prices are said to be maintained by a syndicate of Korean merchants who control the native product. On the other hand, the demand for the article is apparently limited only by the exorbitant price, and with an increased supply and consequent reduction of price will come an increased demand for the roots.

The Experiment Station would not encourage ginseng culture in Maine, but those intending to attempt this industry would do well to procure the little book "Ginseng," by M. G. Kains (published by Orange Judd Company, New York); also Bulletin 16, Div. of Botany, U. S. Dept. of Agriculture

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* The Station is indebted to Hon. N. B. Critchfield, Secretary of Agriculture, of Pennsylvania. for the use of the electrotype for figure 35 and for permission to copy figures 36 37, and 38.

CANKER WORMS.

W. M. Munson.

Every year come complaints of the defoliation of orchard and shade trees in May and early June. This trouble is usually caused by small slender inch-worms or measuring worms which from their effect upon the foliage are commonly called "canker worms" These larvæ appear in immense numbers just as the leaves put forth in the spring. They are so small in the beginning, however, that they are often overlooked and the cause of the backward appearance of the trees is not recognized. When they first appear, and while not more than one-eighth to one-fourth of an inch long, the larvæ gnaw small holes in the young leaves. As they increase in size the entire leaf, except some of the larger veins, is destroyed and the trees if badly attacked look as if swept by fire.

Two distinct species of insects are concerned in this destructive work, viz., the fall canker-worm and the spring canker-worm. The habits of the two insects are much alike and to the casual observer there are no distinguishing marks. The striping of the larvæ is slightly different, however, and the spring canker-worm has three pairs of legs under the rear portion of its body while the other has but two. Both species are natives of this country and are about equally destructive where they occur. The spring canker-worm is, however, the more widely distributed, ranging from Maine to Iowa and southward to Texas.

THE SPRING CANKER-WORM *(Paleacrita vernata.)*

The male moths of this species have rather large, thin, silky wings, about one inch across when spread. The general color is bluish gray. A well defined row or band of light markings near the outer margin of the front wings, and three darker, irregular bands, across the same wings, together with the slightly lighter color and absence of markings on the hind wings, are characteristic features. The inconspicuous female moths are wingless and, because of this fact, the spread of the species is very slow, occurring mainly by the transportation of nursery stock infested with eggs.

The moths usually emerge from the ground early in the spring—about April, or farther south, in March—and the females climb up the trunks of trees to deposit eggs. The eggs, which are shaped something like hens eggs and are about the size of "fly specks," are deposited in irregular masses, usually partially concealed by loose pieces of bark. They hatch about the time the leaves unfold; the time varying with the locality and the season. The young larvæ are voracious feeders and they grow rapidly, usually attaining full size in from three to four weeks from the time of hatching. Upon reaching full size they drop to the ground, burrowing beneath the surface to a depth of two to five inches. Here each one forms a cell, lined with silk which it spins, and soon transforms to the chrysalis stage, where it remains until the following spring, when the adult moth emerges as before.

THE FALL CANKER-WORM.—(*Alsophila pometaria.*)

The fall canker-worm so closely resembles the other species as to be frequently mistaken for it. For all practical purposes they may be considered together, but the fall canker-worm is more distinctively a northern insect. As in the other species, the female moth (see figure 39 *b*) is wingless, but in this species she lacks the hairiness which characterizes the other. The male moth (figure 39 *a*) has two light bands across the front wings instead of the single one of the preceding, and the rear wings are slightly shaded. The larvæ of this species also, besides having three pairs of legs under the hind end of the body, as shown in figure 40 *f*,

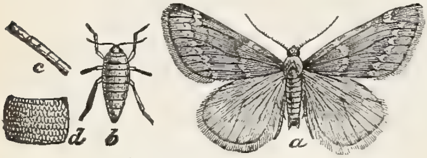

Figure 39—Fall canker worm; *a*. male moth; *b*. female moth; *d*. egg cluster.

have a broad, dark stripe along the back, as opposed to the narrow markings of the other species. The eggs, which are slightly larger than in the previous species, somewhat resemble small flower pots and are attached to the bark, in exposed situations, in masses of from 60 to 200, placed side by side as seen in figure 40, *c*. The eggs highly magnified, are shown in figure 40 *a* and 40 *b*.

The eggs are deposited in fall or early winter (sometimes in mild winters as late as March). They hatch about the same time as those of the other species and the larvæ act in a similar manner, entering the ground about the same time. Instead of forming a cell lined with silk, however, this species spins a tough cocoon, and the moths come forth and begin laying eggs in October and November.

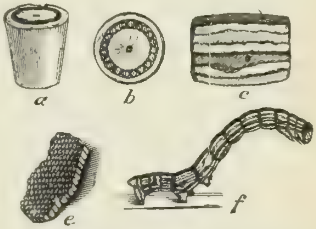

Figure 40 -Fall canker worm; *a.* and *b.* eggs, enlarged; *c.* segment of larva enlarged; *e.* egg cluster; *f.* full grown larva.

HOW TO FIGHT CANKER-WORMS.

The natural enemies of the canker-worms, including Ichneumon, Tachina and Chalcid flies, certain wasps and beetles, and various kinds of birds, are so numerous as to prevent serious damage save in exceptional years. In the absence of these natural enemies, however, or when the weather conditions are specially favorable to the increase of the worms, active measures must be taken to save the trees.

One of the surest preventive measures is to place a band of tarred paper about the tree in March and smear it with printers' ink, thus preventing the ascent of the female moths and the deposit of eggs. In case the bark is very rough, it should be scraped smooth to prevent the insects from crawling up behind the paper. The ink must be renewed often enough to prevent hardening, or it will be of no use. If the fall canker-worm is present, of course the treatment must begin in October. If the trees are already attacked, jarring the limbs will cause many of the worms to spin a thread and drop to the ground. If the band of printers' ink is in place they will be unable to return to the attack and may be destroyed.

The surest way of fighting this pest, however, is by spraying with Paris green or arsenate of lead (Disparene). For this purpose the pump should be powerful enough to develop a pressure of at least 60 pounds to the square inch, and all parts should be made of brass and carefully adjusted. The formulas for use on ornamental trees are the same as those which have heretofore been recommended for use in the orchard, *viz.:* (1) Paris green, 1 pound; lime, 6 pounds; water, 100 gallons; or (2) arsenate of lead or Disparene, 6 pounds; water, 100 gallons. The lime is added to the first formula to prevent injury of the foliage by the Paris green, and should in no case be omitted. The lead arsenate acts slower as a poison than does Paris green, but it adheres to the foliage better. It is important that spraying be done *at once* when the attack of cankerworms is discovered, as the insects are much more difficult to kill as they increase in size.

If more explicit directions for spraying are desired, send to the Experiment Station for directions "How to Fight Apple Enemies."